Economics Education and Research Consortium
Working Paper Series

Economic Policy, Industrial Structure, and Unemployment in Russia's Regions

Tatyana Blinova
Victor Rusanovsky

Working Paper No 01/06

This project (No 99-029) was supported
by the Economics Education and Research Consortium

Research area: **Labor Markets and Social Policy**

JEL Classification: J23, J42, E 24

BLINOVA T.V., RUSANOVSKY V.A. Economic Policy, Industrial Structure, and Unemployment in Russia's Regions. — Moscow: EERC, 2002. — pp 1–40.

The formation of an efficient employment structure as an important factor stabilizing the situation in regional labor markets and its impact on labor markets' behavior are studied. Theoretical and empirical analysis of regional labor market differences and the factors causing these differences are used to assess the structural imbalance in Russia's transition economy. By making cluster and discriminant analyses, the authors provide alternative classifications of the regions and estimate the impact of specific regional factors such as the structure of industry employment and economic policy on regional level on labor markets behavior.

Keywords: Russia, labor market, unemployment, regions, industrial structure.

Acknowledgements. The authors are grateful to Reuben Gronau, Michel Sollogoub, Hartmut Lehmann, and John Earle for their comments. Special thanks to Martina Lubyova and Klara Sabiryanova for helpful recommendations.

Tatyana Blinova

Institute of Agrarian Problems Russian Academy of Sciences
94 Moscovskaya, 410600 Saratov, Russia
Tel.: (8452) 26 88 22
Fax: (8452) 24 25 38
E-mail: ruandre@mail.saratov.ru

Victor Rusanovsky

Saratov State Socio-Economic University
89 Radischeva, 410600 Saratov, Russia
Tel.: (8452) 26 56 49
Fax: (8452) 75 52 12

CONTENTS

NON-TECHNICAL SUMMARY

Regional labor market behavior depends on the combination of a set of macro — and microeconomic factors. One of the specific features of the transition period relates to the increasing role of regional factors. We study the link between Russia's labor markets behavior and specific regional factors such as the structure of industry employment and economic policy on regional level. In the transition period in Russia's regional labor markets were affected by shocks of two types: macroeconomic shocks, common to all markets, and sectoral shocks, which affected certain segments more than others. Research shows that the macroeconomic shocks cause differentiated regional labor market' behavior, because of differences in the regions' employment structures. Regional employment structure makes a region sensitive to sectoral shocks as well. Specialization of the regional employment structure offers certain advantages in the form of scale effects under favorable situations. At the same time, specialization under unfavorable conditions leads to risks of increasing unemployment. In addition preconditions for a monopsonistic or oligopsonistic labor market structure appear. However, diversification of a region's employment structure is a factor reducing these risks.

This paper presents an assessment of the "diversification effects," achieved through the development of the non-state sector, small businesses and the services market. The "specialization effects" are tested for agricultural regions as well as for industrial ones. The "diversification effects" are tested for all regions included in the sample and for a group of agrarian and industrial regions separately.

By using regression models, we analyze how labor market performance depends on the structural patterns of industry employment. Special attention is paid to the comparative analysis of agrarian and industrial regions. Our research shows that high rates of employment in the agriculture weaken the position of the region on the labor market. We study the relationships between labor market performance and the key elements of the economic reform like changes in ownership structure, development of small businesses and the service market. The reaction of regional labor markets to the development of the private sector appeared weak and ambiguous. Regressions show that the share of the private sector does not play an important role in making the region's position on the labor market better or worse. This can be explained in the following two ways. Firstly, the formal change in the "ownership title" of a number of enter-

prises did not bring about any real transformation aimed at increasing the efficiency of employment. Secondly, the private sector was mostly formed as a result of the re-organization of state-owned enterprises and to the least extent owing to the creation of new jobs and companies. Mixed-ownership companies with and without foreign participation produced a stronger impact.

It is shown in this paper that the regions, in which the production decline was compensated by the development of the non-state sector, by small and middle-scale businesses and by the service market, and those regions which created positive incentives for businesses, managed to better adapt to the difficulties. Research shows that development of the services market, improves the regions' position on the labor market for all taxonomic groups. Development of the service sector can be the appropriate way to diversify the employment structure, which can reduce the risks for the regional labor markets.

Research on different labor markets behavior based on the classification of Russia's regions is also important. The results of the discriminant and cluster analyses prove that high rates of employment in the agrarian sector make the region's position on the labor market worse. The agrarian regions' weak position on the labor market does not only manifest itself in a quantitative way, *i.e.*, through high rates of unemployment. It also brings about qualitative changes, causing unemployment to become increasingly chronic and stagnant. Under certain conditions, strategies aimed at developing the non-state sector, small businesses and the service market can smooth the imbalances in the structure of industry employment. However, in a number of regions, this will also require implementing special regional policies. In agrarian regions the development of non-agricultural employment produces positive effects on regional labor markets' behavior. In industrial regions the development of the service market plays an increasingly important role. An increase in the share of non-state ownership and that of small and middle-scale businesses can produce positive effects on labor markets behavior even in regions with biased employment structures.

Application of a uniform approach and averaged Russian labor market assessment seems of little efficiency. Specific features of the regions in terms of how economic reforms are followed should be taken into account. Expansion of Russian labor market regional studies seems to be urgent and important.

1. INTRODUCTION

The economic reforms in Russia (1992–2000) did not bring about any radical changes in the structure of industry employment, which is still inefficient with a big share of agriculture — about 13.0% as compared to 5.1% (agrarian, forestry and fishery sector) in the EU countries. At the same time the service sector remains underdeveloped. Under the administrative system in USSR, social and labor relations were strictly regulated by the state. The centralized planning machine would set the key employment ratios, and equilibrium in the labor market used to be achieved by means of direct regulation of investment flows and the inter-regional and inter-professional mobility of the labor force. In areas, where mobility was low owing to ethnic factors, the problems of employment and incomes would be solved through re-distribution of public consumption funds, extension of social support by the state and policies of industry placement. The latter was mostly aimed at creating huge highly specialized enterprises that would then determine the massive demand on local labor markets. This strategy based on the domination of national economic interests would, of course, reduce social tensions in the short-term, but at the same time it would establish strict specialization of individual regions and local labor markets, creating territorial imbalance in the long run.

For many years the development of regional infrastructure (roads, transport, communications, *etc*.) was financed to a minimal extent, investments mostly going to support the heavy industry sector. A permanent deficit in investment in the infrastructure produced negative effects by decreasing the investment attractiveness of the regions.

The economic reforms in Russia were intended to substitute the administrative regime with market mechanisms. It was expected that market signals, inter-regional mobility of the labor force and expansion of employment in the "new" sector would allow the re-distribution of resources to achieve a supply-and-demand equilibrium in the labor market based on efficient employment ratios.

In neoclassic economic theory, the problem of regional labor market differences is only treated as a short-term problem. In the middle- and long-term perspective, inter-regional migration and regional policies tend to bring the labor market to a state of relative equilibrium. However, the Russian transition economy is in some respects specific, which requires specific explanations.

The institutional immaturity of the transition economy led to a labor market that turned out to be of a rather quasi-market nature. Institutionalization of non-market relations made the labor market insensitive to market signals and actually turned the market into an instrument of support for the "structural imbalances" hampering the rational re-distribution of resources among sectors and industries of the economy (Earl, Sabirianova, 1998; Kapeliushnikov, 2001).

The paradox in the current situation is also that the federal government, while trying to accelerate market reforms and increase the role of market institutions, is facing silent resistance from the regions. As many of the mechanisms applied were rather "virtual," the administrative system finally transformed into a quasi-market structure hindering real structural shifts and rational re-distribution of resources. As a result, the labor market appeared to be regionally segmented, almost insensitive to market signals and having an inefficient structure of employment with a considerable share of employment in agriculture. The role of specific regional factors has increased.

The Russian regions chose different strategies to react to the liberalization of supply and demand, to the introduction of macroeconomic stabilization measures, and to adapt to the new market environment.

We study the correlations between regional labor market behavior and specific regional factors, such as the structure of industry employment and the degree of development of the new sector at the regional level.

In the course of economic reforms, a new sector of the economy emerged, which is based on private ownership, active development of small and middle-scale businesses and a bigger share of employment in the financial and credit, trade, and service sectors. Nevertheless, the inter-regional and inter-sector mobility of labor and the transition of labor to more efficient sectors of the economy are restricted by a number of factors. The most important of these are the underdeveloped housing market, the practice of providing non-financial compensation for labor, wage arrears, high transaction costs (transportation, search for a house and new job, *etc.*) and low wages.

As a result, the situation in the regional labor markets was influenced by both external shocks caused by macroeconomic processes or sectoral changes, and reactions of the regions to economic transformations.

1.1. The share of agricultural employment

Both in Russia and in Central and East European countries, the transformational decline produced the greatest negative effects on the agrar-

ian sector, and the situation in the agrarian labor market did not improve during the reforms. In a number of regions the share of unemployment reached 20–50% of the labor force, with the duration of unemployment also on the rise.

In economically developed countries, agriculture is a part of the multi-industry food complex. It is based on up-to-date industrial technologies, and the share of the agriculture is not large. Non-agricultural sectors supplying machinery and processing agricultural products are dominant. More than 90% of agricultural products undergo industrial processing, while the share of agricultural products in the final food production process does not exceed 10–15%. This system forms a structure of employment with a small share of agricultural employment. The share of agricultural employment in Russia is 2–3 times higher than that in European countries and USA.

The *kolkhoz* and *sovkhoz* system in USSR was based on monopolistic state ownership, subsidies granted by the state, and the excessive number of workers, which used to compensate for low labor efficiency. As a result, a sectoral structure of the agricultural and industrial complex with a big share in agriculture was formed and still remains.

Underdeveloped storage and specialized transport systems, up-to-date trade equipment, and packaging and processing industries used to restrict the sphere of employment in rural areas and small towns (couldn't stimulate positive regional development and the creation of new jobs). Structural changes in these conditions were inevitable.

Table 1.1. Average annual employment by industries, %.

	1980	1990	1994	1995	1998	2000
Industry	32.5	30.3	27.1	25.9	22.2	22.4
Agriculture	14.6	12.9	15.1	14.7	13.7	13.0
Wholesale and retail trade, catering	8.3	7.8	9.5	10.1	14.5	15.0

The decrease in the share of agricultural employment during the transition period was slow. The table shows that during twenty years the share of employment in the agriculture dropped just 1.2 per cent from 14.6% in 1980 to 13.0% in 2000 (Russia in Figures, 2001).

In 1991 agrarian reform began aimed at changing the land ownership structure, transforming the *kolkhozes* and *sovkhozes*, developing pri-

vate business and abandoning the state land ownership monopoly. At the initial stage, this was achieved through privatization, re-organization of *kolkhozes* and *sovkhozes*, and the creation of private farms. At the second stage, regional land markets were formed, rent and mortgage relations were established, and land was re-distributed in the favor of more efficient owners. It is important to know, which of the impact of the high share of agriculture in the structure of employment on the regional labor markets' behavior, which of the effects of the major agrarian reform actions (liquidation of state monopoly and creation of a new ownership structure, support to small businesses, service market development) on the regional labor markets' behavior.

1.2. The effects of regional industrial production specialization

Unlike in Central and Eastern Europe, where liberalization, privatization and macroeconomic stabilization led to a decrease in employment in the raw material and agrarian sectors in the favor of the service sector, the increase in raw material exports and the prices of oil caused employment in the raw material sector of Russia to grow. Regions with big shares of processing industries, like military industries, machine-building, metal working, instrument-making and light industries, suffered greatly, as the release of labor in these sectors topped the Russian average.

The economic structure of a region can make it more (or less) sensitive to asymmetrical shocks. It is shown in the works of Russian and foreign researchers (Perevalov, Gimadi, and Dobrodey, 2000; Barbone *et al*., 1996) that considerable differences exist in the adaptation of the industry sectors. Our study proves that such differences exist not only in sectoral, but in regional adaptation as well. Employment in enterprises in the raw-material and export-oriented sectors has increased, while the light industry enterprises have sharply reduced the number of personnel and labor productivity. This is also the case for the machine-building and especially the instrument-making sectors (see Table 1.2).

The transformation recession had different effects on different segments of the market. The higher the regional employment specialization, the larger the extent to, which the regional labor markets were dependent on the situation in the sectoral markets, and the more vulnerable they were to sectoral shocks. A diversified structure of employment allows for distribution of the risks of unemployment among different segments of the market. To what extent can the sectoral effect become regional, thus affecting the local labor markets?

Table 1.2. Dynamic of employment by industry, (1985 = 1).

	1990	1995	1998
Mining and manufacturing	0.91	0.69	0.57
Electric power industry	1.044	1.437	1.632
Oil extracting industry	1.123	1.746	2.344
Gas extracting industry	1.125	1.583	2.292
Machine-building and metal cutting industry	0.91	0.58	0.46
Instrument-making industry	0.90	0.47	0.23
Light industry	0.87	0.57	0.34

2. OBJECTIVES AND HYPOTHESIS

The objective of this research is to estimate the impact of specific regional factors such as the structure of industry employment and economic policy on regional level on labor markets behavior.

During the transition period (1992–2000), the model of a segmented market with an inefficient structure of employment was formed, where regional clusters, which do not compete with each other, exist. The unified space of the labor market was broken. It seems quite impossible to regulate the labor market on the basis of maintaining unified economic conditions and applying market tools without weakening the stimuli for one group of regions and infringing on the interests of the others. Due to the fact that the labor-market is so regionally heterogeneous, persistent regional differences form various behavioral reactions to external shocks. This means that inside the national labor-market parallel structures (or regional clusters) are functioning, and each of them is characterized by an employment structure of more or less the same type, as well as by similar behavioral reactions to external shocks.

This paper tests the following hypothesis.

Hypothesis 1. *Structure* of *industry employment effect*. The regions with a high share of agricultural employment in the employment structure have a weaker position on the labor market. For Central and Eastern European countries, this hypothesis has been tested and proved by Scarpetta and Huber, (1995).

Hypothesis 2. *Diversification effects*. Formation of a certain ownership structure reflects the priorities of the economic policy. Regions with a

higher share of non-state sectors, small businesses, service markets have a more advantageous position on the labor market. To test both hypotheses, we used data from Russia's Labor Force Survey (Appendix A).

3. LITERATURE REVIEW

Comparative research of labor markets' behavior has been done by many economists. (Bean, 1994; Elhorst, 1994; Huber, 1997; Mur and Trivez, 1994; Svejnar,1991; Saez, 1996). The literature presents three general approaches to analyzing regional differences in unemployment rates:

(1) the regional rate is viewed as "residual" in the labor market demand and supply equilibrium model;

(2) the regional rate is viewed as a dependent variable in a stochastic equation showing, among other things, the social and economic position of the region;

(3) the regional rate is viewed as a basic variable. In this case the key economic factors are identified, which explain the differences between the regional and national unemployment rates.

Layard, Jackman, and Nickell (1991) and later other authors published a number of works, in which they explain the unemployment rate differences in economically developed countries. With the use of a dynamic non-linear equation, the inter-country differences are explained by the peculiarities of the institutional structures.

The task of our research is to assess the impact of specific regional factors, such as industrial structure and economic policy at the regional level, aimed at new sector formation, on labor markets' behavior.

Taxonomy analysis, to a great extent, has been based on the approach proposed in the works of Scarpetta and Huber (1995), in which regions with better industrial structures and diverse activities are supposed to be able to derive profit from the price and trade liberalization process, while backward agricultural areas and heavy industry centers suffer from a reduction in state support and changes in the structure of demand.

In order to classify the regional labor markets and measure the influence of the region's economic structure, the authors (Scarpetta *et al*.) applied a consequent multi-dimension sampling process, which consists of four stages. At the first stage, discriminant analysis enables the authors to identify highly specialized regions. And the share of employment in the agricultural or industrial sector, measured in standard deviations from

the average, must match with certain selection criteria. At the second stage, three major groups are formed, two of which include highly specialized regions. At the third stage, regions with better economic structures and probably better prospects are formed. Two sets of indicators were applied. The first included the local infrastructure condition index represented by the number of telephone lines per 100 people, and it was assumed that a developed infrastructure could stimulate positive regional development and the creation of new jobs. The second set of indicators accounted for the specialization of the region. If the region was mainly agricultural, the authors would account for the availability of tourist services in the area or apply the share of employment in trade, believing that the extension of tourist services often complimented farming and depressed the tension in the labor market. Trade is one of the most dynamic sectors in all transition countries, and employment levels exceeding the average rate can be an important signal of the diversification of the economic activity in the region. For industrial regions, along with the infrastructure development index, such indicators as the share of employment in the private sector or the average size of an industrial enterprise, were applied. The group of diversified regions was derived as a residual, and was, consequently, highly heterogeneous. The authors, therefore, applied a wider range of factors to include, beside the share of employment in the private sector and the tourist activity index, the index of investment in human capital. As a result, 7 groups of regions were singled out: (1) advanced agricultural, (2) other agricultural, (3) advanced industrial, (4) other industrial, (5) remainder specialized regions, (6) advanced diversified, and (7) other diversified. The authors applied this approach as the basis for classifying the Russian regions and analyzing the behavior of relatively homogeneous typological groups in the labor market. Our approach is only different in some individual aspects of the analysis. While in Central and Eastern Europe, regions with employment based primarily on raw material extraction and industrial production suffered the most during the transition period, Russia's regions, specializing in raw material extraction, except for those specializing in coal mining, benefited from the increase in exports and prices of energy. The production and employment decline to a larger extent affected the machine-building sector (especially instrument-making) and light industry. For that reason we singled out the industrial regions in general without paying special attention to heavy industry.

The share of agricultural employment in the overall structure of employment in Russia is considerable. In some regions the rate of rural unemployment reaches 22.0–52.7%. In view of this we assumed that the bigger the share of agricultural employment in the regional structure of employment, the higher the probability of unemployment. Moreover, the

global structural shifts and employment trends show that economic growth is usually accompanied by a decrease in the share of employment in the agrarian sector with a simultaneous rise in the share of the service sector and processing industry. However, rural tourism was not taken into account in our study because of its insignificant position in the Russian labor markets. The indicators of regional differences by numbers of telephone lines per 100 people correlate with the labor market indicators quite vaguely and were therefore eliminated from the analysis. (Appendix B).

In general, following the methods described by Scarpetta and Huber, we based our work on the assumption that diversification of the economic structure of a region and economic policies supporting a "new" sector by promoting private initiative, small businesses, regional infrastructures and investments in human capital reduce the risk of unemployment.

4. THEORETICAL AND ECONOMETRIC MODEL

4.1. Market structure

The function of the regional demand for labor is an aggregate function of the demand of all firms operating in the region. The function of the regional supply of labor is an aggregate function of the supply from all local households. Regional demand is driven by firms maximizing profits, while regional supply is set by households maximizing utility. Regional unemployment is viewed in the economic literature as a type of structural unemployment caused by problems in some individual branches and spheres of employment concentrated in some certain regions of the country.

Regions with different industrial and market structures also differ in terms of their labor market situation. Their belonging to certain typological groups determines their labor market performance. Regional unemployment in this case is a function of the economic structure of the region that cannot be changed in the short term.

Competitive and monopsonistic labor markets. Specialized regions form a structure of the local labor market with the monopsonistic (oligopsonic) position of a large enterprise. Monopsony (oligopsony) can influence the wage rate and the employment rate. The employment rate under monopsony is lower than that under the conditions of a perfectly competitive labor market. The agrarian labor market provides for both the monopsony effects and the monopolistic position of a large agricultural enterprise on some product's market. This corresponds to the lowest

employment rate. It is shown in the works of Ehrenberg and Smith that in a labor market that is monopsonized, wages (W_m) and employment (E_m) levels are below W_c and E_c (under the condition of perfect competition). $E_m < E_c$. Patterns of pure monopsony in the labor market are difficult to find. But the labor markets for rural workers in the agrarian sector or particularly the labor markets in small towns are partially monopsonized. (Ehrenberg and Smith, 1996).

In specialized industrial regions, there emerges the situation of oligopsony on the labor market and competition on the product's market.

In diversified regions, the labor markets appear to be competitive.

4.2. Static equilibrium under different types of market structure

Suppose that Y_{it} stands for the labor market performance without taking into account the labor market structure. Let Mit represent the "monopsony effect." Equilibrium of the regional markets will be achieved when:

$$Y_{it}^{m} = Y_{it}^{c} \pm M_{it}, \tag{4.1}$$

where: Y_{it} — labor market performance: Un_{it}, D_Un_{it}, E_{it}, L_{it}.

In diversified regions, equilibrium is achieved when the unemployment rate reflects the market situation. In specialized regions, market equilibrium takes into account the "monopsony effect."

Equation (4.1.) has the following explanation: in the case of production and employment decline in specialized regions, the behavior of unemployment and other labor market performances strongly depends on the "monopsony effect" in the short term.

If the share of specialized regions is relatively small, then the difference in the unemployment rates (other labor market performance) between specialized and diversified regions is smaller. In the opposite case the difference is bigger. Beside changes in demand, there exist other factors making the behavior of the labor market indicators differ. If demand for the products of specialized regions remains big, the regional differences in the labor market indicators in diversified and specialized regions are insignificant, as the "specialization effect" does not reveal itself. The differences also become smaller as the inter-regional mobility of the labor force becomes more extensive.Restricted inter-regional mobility leads to a situation in which specialized and diversified regions do not compete with each other in the short term. Market adjustment of inter-regional differences manifests itself in these conditions quite weakly.

Specialization is a consequence of territorial labor division based on the comparative economic advantages of the regions. Economic causes of segmentation based on the comparative advantages of the regions will be in effect in the long run as well. This serves as a condition for employment instability, and a high risk of unemployment in specialized regions ensues as a consequence of sectoral demand shock risks. A successful situation in the specialized labor markets means additional expenses on diversifying the structure of demand.

4.3. The impact of economic policy

Economic policies aimed at developing the private sector, small- and middle-scale businesses, the service market and the regional infrastructure affect the labor market in many aspects: the investment attractiveness of the region grows, it's prospects get better, the sphere of employment expands and new additional jobs are created. As a result of positive shocks, the "diversification effects" become apparent. Economic policy impact can be described by using a two-sector model. (Aghion and Blanchard, 1994). It is assumed that there exist "old and a "new" sectors of the economy. While the "old" sector is undergoing economic modernization based on market principles, it loses its labor resources; at the same time the developing "new" sector attracts these resources. The rate and duration of unemployment in a region depends on both the velocity and nature of the release of personnel by the "old" sector and the scope of "attraction" of the labor force by the "new" sector. So, the stagnating segments of the economy lose their labor force, and the developing ones attract it. If the region implements economic policy aimed at expanding the labor demand in the "new" sector, then the risk of unemployment decreases. If small and middle-scale businesses, the private sector, infrastructure and education are underdeveloped in the region, the risk of unemployment increases.

4.4. Combined analysis

The link between labor market performance and specific regional factors such as the structure of industry employment and economic policy on regional level can be described by simple model:

$$Y_{it} = F(X_{it}, Z_{it}) = \beta_0 + X_{it}\,\beta_1 + Z_{it}\,\beta_2 + \xi\,. \qquad (4.2)$$

Here:

Y_{it} — labor market performance in region i, at time t: U_{it}, D_Un_{it}, E_{it}, L_{it};

Un_{it} — unemployment rate;

D_Un_{it} — duration of unemployment;

E_{it} — employment rate;

L_it — labor force participation;

X_{it} — a vector of regional compositions of the industry employment structure;

Z_{it} — a vector of local shares of the "new sector."

5. MODEL SPECIFICATION AND ESTIMATION RESULTS

5.1. Estimation of the influence of the regional structure of industry employment on labor markets behavior

The dependence of labor market performance on regional structure of industry employment was tested by using the following regression equations:

$$Un_{it} = \beta_0 + \beta_1 Sh\_Agr_{i,t-n} + \beta_2 Sh\_Ind_{i,\,t-n} + \beta_3 S_{i,\,t-n} + \beta_4 P_{i,\,t-n} + \xi\,, \quad (5.1)$$

$$D\_Un_{it} = \beta_0 + \beta_1 Sh\_Agr_{i,\,t-n} + \beta_2 Sh\_Ind_{i,\,t-n} + \beta_3 S_{i,\,t-n} + \beta_4 P_{i,\,t-n} + \xi\,, \quad (5.2)$$

$$E_{it} = \beta_0 + \beta_1 Sh\_Agr_{i,\,t-n} + \beta_2 Sh\_Ind_{i,\,t-n} + \beta_3 S_{i,\,t-n} + \beta_4 P_{i,\,t-n} + \xi\,, \quad (5.3)$$

$$L_{it} = \beta_0 + \beta_1 Sh\_Agr_{i,\,t-n} + \beta_2 Sh\_Ind_{i,\,t-n} + \beta_3 S_{i,\,t-n} + \beta_4 P_{i,\,t-n} + \xi\,. \quad (5.4)$$

Here:

Un_{it} — unemployment rate in region i at time t;

D_Un_{it} — duration of unemployment in region i at time t;

E_{it} — employment rate in region i at time t;

L_{it} — labor force participation in region i at time t;

$Sh\_Agr_{i,\,t-n}$ — share of employment in agriculture in region i at time $(t - n)$;

$Sh\_Ind_{i,\,t-n}$ — share of employment in industry in region i at time $(t - n)$;

$S_{i,\,t-n}$ — size of region i at time $t - n$;

$P_{i,\,t-n}$ — population density in region i at time $t - n$.

To avoid deviations that might result from size differences among the regions, the regression equation includes such variables like the size of the region (S) and population density (P).

The regression equations were assessed for Russia as a whole and for agrarian and industrial regions separately. This resulted in a system of 12 regression equations. The results are presented in Tables 5.1 and 5.3.

Table 5.1. Estimation results for all regions of Russia.

Y	*X*	*B*	Std_Err	*t*	Sig(*t*)	*F*	Sig(*F*)	R^2	DW
Un	Const	25.31	1.90	13.3	0.000				
	Sh_Ind	−0.39	0.07	−5.5	0.000				
						30.7	0.000	0.299	1.569
D_Un	Const	8.56	0.27	31.5	0.000				
	Sh_Agr	0.05	0.02	3.0	0.004				
						8.9	0.004	0.110	1.414
E	Const	49.68	3.12	15.9	0.000				
	Sh_Agr	−0.27	0.08	−3.5	0.001				
	Sh_Ind	0.20	0.08	2.5	0.016				
	S	0.003	0.001	3.6	0.001				
						24.4	0.000	0.511	1.178
L	Const	64.91	1.00	64.8	0.000				
	Sh_Agr	−0.32	0.06	−5.4	0.000				
	S	0.003	0.001	3.8	0.000				
						28.0	0.000	0.441	1.658

Table 5.2. Estimation results for agricultural regions of Russia.

Y	*X*	*B*	Std_Err	*t*	Sig(*t*)	*F*	Sig(*F*)	R^2	DW
Un	Const	−4.95	6.17	−0.8	0.430				
	Sh_Agr	0.96	0.27	3.5	0.002				
						12.6	0.002	0.411	1.195
E	Const	41.0	3.0	13.7	0.000				
	Sh_Ind	0.34	0.13	2.5	0.021				
						6.4	0.021	0.262	1.530

Table 5.3. Estimation results for industrial regions of Russia.

Y	*X*	*B*	Std_Err	*t*	Sig(*t*)	*F*	Sig(*F*)	R^2	DW
Un	Const	17.56	1.42	12.4	0.000				
	Sh_Agr	−0.24	0.13	−1.9	0.074				
	P	−0.06	0.03	−2.3	0.031				
						6.9	0.004	0.376	2.193
L	Const	66.72	1.02	65.1	0.000				
	Sh_Agr	−0.31	0.08	−3.7	0.001				
	S	0.002	0.001	2.0	0.061				
	P	−0.04	0.02	−2.1	0.051				
						13.9	0.000	0.654	1.291

The results of the regression analysis show a significant dependence of the labor market performance on the structure of industry employment. An assessment of the regression equations testing the 1st hypothesis shows a general positive correlation between the labor market performance and the structure of industry employment of the region. The share of employment in agriculture is a significant factor worsening the position of the region on the labor market. The share of employment in industry is a significant positive factor affecting employment growth and unemployment decrease in agrarian regions.

The negative correlation is the highest (for all regions) between the share of agricultural sectors and the employment rate in the region. Agrarian regions show a positive correlation between the unemployment rate and the share of employment in agriculture within the region. A negative correlation exists between the unemployment rate and the share of employment in industry. This is not surprising, as expansion of non-agricultural employment is an important factor improving the position of agrarian regions in the labor market. The correlation between these factors and the employment rate is a little bit lower. The other correlations are less significant.

5.2. Evaluation of the influence of economic policy

In this section we evaluate the influence of economic policies implemented at the regional level on regional labor market performance. Hypothesis 2 poses a relationship between the behavior of regional labor

markets and the development of the "new" sector, *i.e.*, expansion of non-state ownership, small businesses and the service market.

The testing was done based on the following equations:

$$Un_{it} = \beta_0 + \beta_1 Sh\_Pr_{i,\,t-n} + \beta_2 Sh\_St_{i,\,t-n} + \beta_3 Sh\_For_{t-n} + \\ + \beta_4 Sh\_Ros_{i,\,t-n} + \beta_5 Ent\_Agr_{i,\,t-n} + \beta_6 Ent\_Ind_{i,\,t-n} + \\ + \beta_7 Ent\_Tr_{i,\,t-n} + \beta_8 Sh\_Tr_{i,\,t-n} + \beta_9 Sh\_Fin_{i,\,t-n} + \xi\,, \quad (5.5)$$

$$D\_Un_{it} = \beta_0 + \beta_1 Sh\_Pr_{i,\,t-n} + \beta_2 Sh\_St_{i,\,t-n} + \beta_3 Sh\_For_{t-n} + \\ + \beta_4 Sh\_Ros_{i,\,t-n} + \beta_5 Ent\_Agr_{i,\,t-n} + \beta_6 Ent\_Ind_{i,\,t-n} + \\ + \beta_7 Ent\_Tr_{i,\,t-n} + \beta_8 Sh\_Tr_{i,\,t-n} + \beta_9 Sh\_Fin_{i,\,t-n} + \xi\,, \quad (5.6)$$

$$E_{it} = \beta_0 + \beta_1 Sh\_Pr_{i,\,t-n} + \beta_2 Sh\_St_{i,\,t-n} + \beta_3 Sh\_For_{t-n} + \\ + \beta_4 Sh\_Ros_{i,\,t-n} + \beta_5 Ent\_Agr_{i,\,t-n} + \beta_6 Ent\_Ind_{i,\,t-n} + \\ + \beta_7 Ent\_Tr_{i,\,t-n} + \beta_8 Sh\_Tr_{i,\,t-n} + \beta_9 Sh\_Fin_{i,\,t-n} + \xi\,, \quad (5.7)$$

$$L_{it} = \beta_0 + \beta_1 Sh\_Pr_{i,\,t-n} + \beta_2 Sh\_St_{i,\,t-n} + \beta_3 Sh\_For_{t-n} + \\ + \beta_4 Sh\_Ros_{i,\,t-n} + \beta_5 Ent\_Agr_{i,\,t-n} + \beta_6 Ent\_Ind_{i,\,t-n} + \\ + \beta_7 Ent\_Tr_{i,\,t-n} + \beta_8 Sh\_Tr_{i,\,t-n} + \beta_9 Sh\_Fin_{i,\,t-n} + \xi\,. \quad (5.8)$$

Here:

$Sh\_Pr_{i,\,t-n}$ — share of the private sector in the employment structure (region i, time $t - n$);

$Sh\_St_{i,\,t-n}$ — share of the state sector in the employment structure (region i, time $t - n$);

$Sh\_For_{i,\,t-n}$ - share of mixed enterprises with foreign participation in the employment structure (region i, time $t - n$);

$Sh\_Ros_{i,\,t-n}$ — share of mixed enterprises without foreign participation in the employment structure (region i, time $t - n$);

$Ent\_Agr_{i,\,t-n}$ — share of employment in small agricultural enterprises (region i, time $t - n$);

$Ent\_Ind_{i,\,t-n}$ — share of employment in small industrial enterprises (region i, time $t - n$).

$Ent\_Tr_{i,\,t-n}$ — share of employment in small trade enterprises (region i, time $t - n$);

$Sh\_Tr_{i,\,t-n}$ — share of employment in trade (region i, time $t - n$);

$Sh\_Fin_{i,\,t-n}$ — share of employment in the credit, financial and insurance sectors (region i, time $t - n$);

All the equations were assessed for all regions of RF included in the sample and for the group of agricultural and industrial regions. The results are presented in Tables 5.4–5.6.

Table 5.4. Estimation results for all regions of Russia.

Y	*Z*	*B*	Std_Err	*t*	Sig(*t*)	*F*	Sig(*F*)	R^2	DW
Un	Const	6.04	3.95	1.5	0.131				
	Sh_St	0.25	0.06	3.9	0.000				
	Sh_Ros	−0.16	0.07	−2.4	0.020				
	Ent_Agr	0.75	0.35	2.2	0.034				
						17.2	0.000	0.425	1.754
D_Un	Const	10.10	0.38	26.7	0.000				
	Sh_Ros	−0.04	0.02	−2.2	0.029				
						4.9	0.029	0.064	1.356
E	Const	43.19	3.38	12.80	0.000				
	Sh_Ros	0.22	0.06	3.35	0.001				
	Ent_Agr	−1.11	0.36	−3.09	0.003				
	Sh_Tr	0.60	0.30	2.02	0.047				
						14.4	0.000	0.382	1.216
L	Const	60.13	3.62	16.6	0.000				
	Sh_Tr	0.96	0.30	3.2	0.002				
	Sh_Pr	−0.26	0.06	−4.4	0.000	15.6	0.000	0.306	1.434

Table 5.5. Estimation results for agricultural regions of Russia.

Y	*Z*	*B*	Std_Err	*t*	Sig(*t*)	*F*	Sig(*F*)	R^2	DW
Un	Const	4.95	7.87	0.63	0.538				
	Sh_St	0.40	0.14	2.86	0.011				
	Sh_Ros	−0.31	0.14	−2.17	0.045				
						13.3	0.000	0.610	1.452
E	Const	42.28	2.06	20.52	0.000				
	Sh_Ros	0.32	0.10	3.11	0.006				
						9.7	0.006	0.350	1.783

Table 5.6. Estimation results for industrial regions of Russia.

Y	*Z*	*B*	Std_Err	*t*	Sig(*t*)	*F*	Sig(*F*)	R^2	DW
Un	Const	0.91	4.18	0.22	0.829				
	Sh_St	0.28	0.10	2.93	0.007				
						8.6	0.007	0.263	1.010
E	Const	48.32	2.71	17.82	0.000				
	Sh_Tr	0.65	0.29	2.23	0.035				
						5.0	0.035	0.172	1.803
L	Const	41.70	3.97	10.5	0.000				
	Sh_Tr	1.26	0.32	3.9	0.001				
	Sh_St	0.21	0.07	3.2	0.004				
						13.9	0.000	0.548	1.609

The results of the regression analysis signify some dependence of the labor market performance on the degree of expansion of non-state ownership, small businesses and the service market. Judging by the obtained evaluations of the system of regression equations, for different groups of regions (agricultural, industrial) different sets of factors are important. The positive effects of the private sector are still insufficient to offset a drop in employment in the state sector. Any significant negative influence of private ownership on employment is not observed either. This is in accord with the conclusions made by Commander (1996), Earle and Estrin (1997), Perevalov, Gimadi and Dobrodey (2000) and other authors that have revealed the weak influence of privatization on employment. Our study also proves that labor market performance weakly reacts to the expansion of the private sector. However, an indirect influence manifests itself in the shrinking of the state sector. For all groups of regions there exists steady dependence: the higher the share of the state sector in the previous period, the higher the regional unemployment rate values in the following period. The share of the state sector also has significant positive correlation with the reduction of employment, as excessive numbers of personnel was a feature of large enterprises. The development of mixed ownership exerts positive influence on reducing the rate and duration of unemployment. The share of employment at mixed-ownership enterprises was among the significant factors when the evaluation of the relationship between the unemployment and employment rates for all the regions included in the sample and the group of agrarian regions was done.

The study is based on the assumption that the economic structure of the region and the influence exerted by the "new" sector are exogenous. However, the situation when the non-state sector, small businesses and the service market develop in the regions with a favorable position on the labor market is possible. Another alternative is also possible, when the "new" sector develops in the regions with a crisis situation in the regional labor markets. In both cases incorrect evaluation is possible. In the first case the cause-effect relation between the behavior of the labor markets' and the economic policies implemented at the regional level will be biased. In the second case, the "accumulated unemployment" effects will manifest themselves in the new economic environment. In order to partially remove the endogenous effects, we used the lag structure of the equation.

5.3. The effects of regional industrial production specialization

The main objective of this section is to assess the influence of the concentration of industrial production (the "starting conditions" effect) on the behavior of the regional labor markets on the one hand, and that of the reforms like privatization, formation of new ownership structures, extension of support to small businesses and development of the service market on the other hand. The relationship between the concentration of Russian industry and the risks on the regional labor markets is insufficiently known. This section studies the dependence of labor market performance on the economic structure of the region. The risk factors here are a high rate of concentration of industry in one or several sectors, and poor development of the non-state sector, small and middle-scale businesses and the service market.

$$Y_{it} = \beta_0 + \beta_1 \mathrm{HHI}_{i,\, t-n} + \xi \,. \qquad (5.9)$$

Here:

Y_{it} — labor market performance in region i at time t: Un_{it}, D_Un_{it}, E_{it}, L_{it};

$\mathrm{HHI}_{i,\, t-n}$ — Herfindal–Hirshman index in region i at time t.

Concentration in this case reflects the number and the shares of the sectors represented in the regional structure of employment. The lower the number of sectors, the higher the concentration. If the number of sectors is one and the same, the concentration rate is expressed by the shares of the sectors represented in the structure of employment: the bigger the share of the dominant sectors, the higher the concentration. For instance, in the Ivanovo Oblast, the share of light industry in regional manufacturing employment structure is 55%. A crisis in light industry

made the position of the region on the labor market worse. In the Tyumen Oblast, a considerable part of the regional structure of employment is in the fuel industry. The export orientation of many of the enterprises in this sector contributes to the increased number of employed. The response of the regional labor markets to sectoral and macroeconomic shocks manifests itself in the different behavior of the labor markets, *i.e.*, changes in the rate and duration of unemployment, rate of employment and economic activity.

Table 5.7. Dependence of labor market performance on the industrial production concentration rate.

Y	HHI	*B*	Std_Err	*t*	Sig(*t*)	*F*	Sig(*F*)	R^2	DW
E	Const	46.89	2.68	17.5	0.000				
	HHI	26.86	11.98	2.2	0.028				
						5.0	0.028	0.065	1.709
Un	Const	21.31	1.65	12.9	0.000				
	HHI	−28.85	7.39	−3.9	0.000				
						15.2	0.000	0.175	1.114
D_Un	Const	10.91	0.36	30.0	0.000				
	HHI	−4.20	1.62	−2.6	0.012				
						6.7	0.012	0.085	1.757
Un_Agr	Const	23.94	3.21	7.4	0.000				
	HHI	−40.85	15.49	−2.6	0.017				
						6.9	0.017	0.279	2.017

There exists a positive correlation between the rate of employment and the rate of concentration of industrial production in the region. A negative correlation between the rate and duration of unemployment and the production concentration rate is revealed for all regions included in the sample, especially for the group of agrarian regions.

The concentration of jobs in dominant sectors brings about negative consequences when regional specialization rates are relatively high, referring to crisis sectors.

We assume that diversification within the structure of jobs is possible not only as a result of changes in the sectoral structure of employment, but also owing to the development of the non-state sector, small and middle-scale businesses and the service market. A diversified structure is

less open to risks, as decline in one segment of the market is offset by expansion of employment in other sectors. Re-distribution of the resources leads to the leveling of the macroeconomic risk and reduction of the sectoral risk.

In this section we assess the influence of the following two factors: — concentration rate measured by the Herfindal-Hirshman index (HHI); share of the non-state sector (*Sh_NSt*), small businesses (*Ent*) and the service market (*Sh_FTr*). Assessment of the influence of these two factors on the behavior of the regional labor markets can be implemented on the basis of a model with a lag structure (for regions where $HHI_r > HHI_n$, and $HHI_r < HHI_n$).

$$Y_{it} = \beta_0 + \beta_1 Sh\_Pr_{i,\,t-n} + \beta_2 Sh\_St_{i,\,t-n} + \beta_3 Sh\_For_{t-n} + \\ + \beta_4 Sh\_Ros_{i,\,t-n} + \beta_5 Ent\_Agr_{i,\,t-n} + \beta_6 Ent\_Ind_{i,\,t-n} + \\ + \beta_7 Ent\_Tr_{i,\,t-n} + \beta_8 Sh\_Tr_{i,\,t-n} + \beta_9 Sh\_Fin_{i,\,t-n} + \xi\,, \qquad (5.10)$$

Here:

Y_{it} — labor market performance in region i at time t: Un_{it}, D_Un_{it}, E_{it}, L_{it};

Table 5.8. Dependence of labor market performance on the share of the "new" sector in regions with different industrial production concentration rates.

Y	*Z*	*B*	Std_Err	*t*	Sig(*t*)	*F*	Sig(*F*)	R^2	DW
($HHI_r > HHI_n$) *Un*	Const	15.662	6.260	2.502	0.018				
	Sh_NSt	−0.206	0.083	−2.484	0.019				
	Sh_FTr	0.860	0.354	2.428	0.021				
						6.808	0.004	0.312	1.445
($HHI_r < HHI_n$) *Un*	Const	37.969	5.724	6.633	0.000				
	Sh_NSt	−0.394	0.103	−3.841	0.000				
						14.75	0.000	0.291	0.974

There are certain data indicating the occurrence of, specialized regions with developed "new" sectors that occupy better positions on the labor market, other terms being equal. Nevertheless, the labor markets reaction to the development of the "new" sector observed in other regions is weak. The economic structure of a region is a significant factor determining the regional differences in labor market performance. A bigger share of the industry makes the region's position on the labor market better. However, domination of a limited number of sectors in the struc-

ture of employment makes the regional labor market more sensitive to sectoral shocks. In these circumstances diversification of the regional structure of employment through expansion of the non-state sector, small businesses and the service market can improve the situation on the labor market.

6. A COMPARATIVE ANALYSIS OF RUSSIA'S REGIONS

6.1. Taxonomy.

Russian regions are viewed as separate economies. Two approaches can be taken to analyzing the regional segments of the labor market. The first one is that classification of the regions is made and tested for its reliability, and then it is determined whether the members of the homogeneous groups demonstrate similar kinds of behavior on the labor market. The second approach classifies regions with similar values in their labor market performance into groups, and then the factors explaining the given kind of behavior are identified. Basing our method on the first approach, we have classified the regions by employment structure indicators and then compared the resulting groups with the models of labor market behavior.

Our hypothesis presumes the existence of relatively homogeneous macro-groups that can be described by similar employment structure characteristics. Geometrically, this means dissolution of the regions into a corresponding number of "clusters." Therefore, in addition to the approach suggested by Scarpetta and Huber (1995), we will employ the empirical cluster analysis method enabling us to identify those "concentrations" and at the same time test the reliability of the basic taxonomy.

When stating the problem of constructing an optimal procedure for classifying p-dimensional observations X_1, X_2, ..., X_n, the classified observations are interpreted as a sample taken from the general totality described by a mixture of k classes (single-modal general totalities) with the probability density

$$F(X) = \sum_{j=1}^{k} \pi_j f_j(X), \qquad (6.1)$$

where π_j is an a-priori probability of appearance in that sample of an element from class j with the density $f_j(x)$, *i.e.*, π_j is the share of elements from j-class in the common general totality (Aivazian, Mkhitarian,1998).

Formalization of the Concept of "Relative Homogeneity" of Typological Macro-groups. In the literature the concept of homogeneity of objects is defined by setting the rule of calculation of the p_{ij} value by characterizing either the $d(X_i, X_j)$ distance between the objects X_i and X_j from the studied totality $X(i, j = 1, 2, \ldots, n)$ or the rate of similarity $r(X_i, X_j)$, *i.e.*, the closeness of the objects. Comparing $d(X_i, X_j)$ with some threshold value, we can view close objects as homogeneous, that is belonging to one and the same class. The remoteness of two regions from each other in the space of features can be measured by employing the Mahalonobis distance.

A basic classification of Russia's regions was made by applying the method proposed by Scarpetta and Huber (1995). The multi-dimensional sampling process included the following stages. First of all two groups of regions were formed, those being specialized regions (a) and the remainder regions (b).

Specialized regions in the studies of Scarpetta and Huber (1995) can be characterized as such: the share of employment in agriculture or industry measured in standard deviations is above the critical value. At the next stage, agricultural, industrial and other regions were picked out from the first group by applying the same criteria.

The next step consisted of identifying, within the two major groups of highly specialized regions, those regions with a better economic structure and, possibly, better prospects. The system of indicators employed at the final stage includes the following: local infrastructure development index, above average trade activities, above average share of employment in finance banking and insurance and so on, the private sector development index and rate of education of the population.

As a result, the regions with the best economic structures and best prospects were singled out with the use of specific average by group values playing the role of borders for the variables (GR). Calculated were the average by group values for the indicators, and the inner — group variability in unemployment rates was estimated. The typology was analyzed in the system of labor market indicators. A number of tests were employed to check the quality of the taxonomy. Besides that, several classification variants were developed based on cluster analysis. (Appendix C).

6.2. The structure of industry employment and labor market performance

Our major objective is to identify the statistical dependence between risks on the regional labor market and specific features of the structure of demand for labor. The existing structure of industry employment in its

concentrated form presents distortions accumulated by the initiation of reforms and characterizes the starting conditions of the reform. With respect to the variables representing the industrial structure, it was assumed that a higher share of agriculture would increase the risk of unemployment. In relation to the variables reflecting the results of the regional economic policies, it was assumed that a high rate of employment in the private sector, joint companies, small businesses, and the service sector would reduce the risk of unemployment, bring about relative stabilization in employment, and make the demand for labor and incomes increase along with the outflow from unemployment. The hypotheses are tested by developing a taxonomy which includes three typological groups: agrarian, industrial and diversified, and by measuring the differences in the behavior of their respective labor market performance.

Table 6.1. Taxonomic groups.

	Mean	Std. Deviation	Valid No
(1) *Agr Sh_Agr*	19.8	3.5	20
Sh_Ind	19.1	5.7	20
(2) *Ind Sh_Agr*	8.7	3.6	26
Sh_Ind	28.2	2.8	26
(3) *Div Sh_Agr*	9.7	3.6	25
Sh_Ind	20.3	2.9	25
(4) Total *Sh_Agr*	12.2	5.9	71
Sh_Ind	22.9	5.6	71

The results of the discriminant analysis show the taxonomy to be of high quality. Tests of the results with the use of λ-Wilks' statistics show a high significance of the resulting classification. For both of the indicators applied (*Sh_Agr* and *Sh_Ind*), the observed rate of significance does not exceed 0.001.

Tests of the quality of fragmentation with the use of *M*-Box's statistics characterizing the criterion of equality of co-variation matrixes also show a high significance for the results obtained. To test the equality of the centers of the resulting canonic discriminatory functions, we applied the integrated λ-Wilks' criterion. The rate of significance (<0.001) speaks for the quality and reliability of the taxonomy. Detailed results of the discriminatory analysis are presented in the Appendix C.

The taxonomy enabled us to look at the Russian national labor market as a total of three macrosegments. Segment (1) is characterized by rela-

tively high employment in agriculture, segment (2) is characterized by a relatively high concentration of industrial production on the regional level, segment (3) has no distinctly expressed sectoral specialization and is conventionally denoted as diversified. This segment includes heterogeneous groups of regions whose behavior is specific. First, these groups include Moscow and Leningrad Oblasts with developed service sectors and better infrastructure. Second, the group of regions with a relatively high share of employment in the industrial sector is included. And finally, the group of regions with traditional agrarian orientations is included. The situation on the labor market is usually better in the first group of regions.

Table 6.2. Labor market performance.

Labor market performance	(1) *Agr*	(2) *Ind*	(3) *Div* (3)	(4) Total
Un_{av}	16.6	13.0	15.9	15.0
Un_{min}	9.5	7.1	9.6	7.1
Un_{max}	30.8	21.0	26.2	30.8
Std_Err	6.0	3.3	3.8	4.5
D_Un_{av}	9.8	9.0	9.1	9.3
D_Un_{min}	7.3	7.9	7.3	7.3
D_Un_{max}	11.9	10.4	11.7	11.9
Std_Err	1.3	0.6	1.1	1.0
E_{av}	48.2	54.3	52.1	51.8
E_{min}	36.5	49.4	41.1	36.5
E_{max}	52.7	57.6	60.8	60.8
Std_Err	4.0	1.9	5.1	4.6

The taxonomy of the regions was compared with labor market behavior characteristics. As seen from Table 6.2, the unemployment rate and the values of other labor market indicators are higher than the Russian average. Besides that, the labor market situation in agrarian regions is less favorable than in the regions included in the two other groups — industrial and diversified — which manifests itself in higher unemployment rates, greater duration of unemployment, lower rates of employment or economic activity.

High rates and considerable duration of unemployment and low rates of employment in agrarian regions are explained by certain distortions on the labor market occurring because of the changes in the demand for labor.

Sectoral shocks affected the production and employment decline in the agriculture sector, reinforced by the failure of traditional economic relations, sharp reductions in subsidies from the state, weak positions of the domestic food products on the market and big competitive advantages of certain food products produced abroad.

6.3. Estimation of the influence of the "new" sector on labor market performance

We observe an enlarged two-sector model when each of the segments we have identified is divided into two sub-groups, the first one comprising the regions with a higher share of employment in the "new" sector, and the second one containing the remainder regions. The demand for labor is decreasing in the "old" sector and increasing in the "new" one. In the regions with a higher share of the "old" sector, the situation on the labor market is worse; this, is the opposite for the regions with a higher share of the "new" sector. The "new" sector includes private enterprises, joint companies with foreign participation, small and middle-scale businesses, *etc*. For the purpose of testing of the hypotheses, we have developed a taxonomy of the regions consisting of 6 typological groups. The set of typological variables characterizing the sectoral structure of employment was complemented with variables characterizing the economic policy aimed at expanding the "new" sector in the region. In order to make a classification, we used a group of indicators to include the share of small businesses in trade and public catering, the share of employment in trade and public catering, the share of employment in the financial and credit sector, the share of employment in private companies, the share of employment in joint-stock companies with foreign participation, as well as the share of employed people having higher professional education, the share of those having secondary professional education, and the relation of the average income per head to the living wage. At the initial stage we have calculated the averages for each of the three viewed types of regions (*Agr*, *Ind*, *Div*). At the second stage we applied the main component method to decrease the feature space and group the initial indicators. The main components obtained enabled us to breakdown the initial indicators into three groups, taking into account the factor loads we had obtained. The first group includes the share of small businesses in trade and catering, the share of em-

ployment in trade and catering, the share of employment in the financial and credit sector, the share of employment in private companies, and the share of employed people having higher professional education and the share of those having secondary professional education. The second group consists only of the share of employment in joint-stock companies with foreign participation. And, finally, the third group is represented by the relation of average income per head to the subsistence minimum level (average per capita, monthly).

At the third stage, the resulting groups of indicators were applied in order to classify the regions as "advanced (developed)" and "other" (Table 6.3).

Table 6.3. Estimation of the influence of economic policy on regional labor markets performance.

Dependent variables	"Advanced"	"Other"
(1) *Agr*		
Unemployment rate, %	13.7 (2.6)	18.2 (6.7)
Duration of unemployment, months	9.4 (0.8)	9.9 (1.5)
Employment rate, %	49.4 (2.2)	47.6 (4.7)
(2) *Ind*		
Unemployment rate, %	10.4 (1.6)	13.4 (3.3)
Duration of unemployment, months	9.0 (0.3)	9.0 (0.6)
Employment rate, %	54.9 (2.9)	54.2 (1.8)
(3) *Div*		
Unemployment rate, %	12.5 (1.8)	16.5 (3.7)
Duration of unemployment, months	8.5 (0.6)	9.3 (1.1)
Employment rate, %	55.4 (2.3)	51.5 (5.3)

In brackets — Std. Err.

The above results were also tested by performing a discriminant analysis, which showed the statistical significance of the classification (significance of λ-Wilks' criteria and M-Box's statistics).

Table 6.4. Agrarian regions: Labor markets performance, mean.

Labor market performance	Regions with better position on labor market	Regions with worse position on labor market
Unemployment rate, %	14.0 (2.6)	26.8 (4.5)
Duration of unemployment, months	9.4 (1.2)	11.3 (0.7)
Employment rate, %	49.7 (2.2)	42.2 (4.2)

In brackets — Std. Err.

Table 6.5. Industrial regions: Labor market performance, mean.

Labor market performance	Regions with better position on labor market	Regions with worse position on labor market
Unemployment rate, %	11.2 (1.6)	17.1 (2.1)
Duration of unemployment, months	8.8 (0.4)	9.5 (0.6)
Employment rate, %	54.8 (1.4)	53.3 (2.5)

In brackets — Std. Err.

Table 6.6. Diversified regions: Labor market performance, mean.

Labor market performance	Regions with better position on labor market	Regions with worse position on labor market
Unemployment rate, %	14.5 (2.3)	21.4 (3.7)
Duration of unemployment, months	8.8 (0.8)	10.5 (0.9)
Employment rate, %	54.0 (3.5)	44.6 (3.2)

In brackets — Std. Err.

The results of the discriminant analysis show the taxonomy to be of a high quality.

7. CONCLUSION FOR ECONOMIC POLICY

The transitional Russian economy gave birth to a regionally segmented labor market with an inefficient structure of industry employment.In the suggested theoretical model, the regions, first, have different starting conditions and, second, pursue their economic policies in different ways. Economic policies include privatization and promotion of private ownership, small and middle-scale businesses, the financial and crediting sector, trade, local infrastructure (roads, telecommunications, *etc*.) and investments in human capital. In general, from a theoretical point of view, this approach is actually the strategy of economic development taken by a region intending to increase its investment attractiveness. In equilibrium all regions spend a considerable part of their funds on infrastructure (institutional development), but the advantages on the labor market are only realized by those that, first, have a higher rate of institutional development and, second, have a more efficient structure of employment.

Changes in unemployment rates are connected with both macroeconomic (symmetric) and sectoral (asymmetric) shocks taking place in the economy, causing the regional labor markets to react. We assumed that unemployment rates and the behavior of the regional labor market are determined by heterogeneous reactions of the regions to shocks. In this situation, a regional structure of employment with a high degree of specialization increases the risk of unemployment, while an employment structure with greater diversity reduces such risk.

In the regions where the employment structure has a considerable share of agricultural employment, the risk of unemployment is higher.

The industrial structure is formed over a long period of time and depends on the state's strategy of production placement within the territory of the country. The institutional structure of employment highly depends on the economic policy of the region and on the rate of development of small businesses, the private sector, enterprises with foreign participation, infrastructure, and on the amount of investment in human capital. If the economic policy implemented in the region has the aim to increase the efficiency of the institutional structure of employment, the risk of unemployment tends to be lower. At the same time, if the private sector, infrastructure, small businesses and education are underdeveloped, the risk of unemployment in that region is high.

Consequently, unfavorable starting conditions for entering the labor market and the inefficiency of the structure of industry employment can be to a certain extent offset by a regional economic policy intended to pro-

mote the non-state sector, small and middle-scale businesses, regional infrastructure and investment in human capital.

A specific feature inherent to the labor market in the majority of Russia's regions is the oligopolistic structure determining the "starting" conditions for economic reforms. Specialized regional production would make the national economy in general work. The regional labor markets are oligopsonic, where the raw material sector and the ferrous and non-ferrous metallurgical sector have a big share in the demand for labor. In Russia, the above sectors managed to adapt to the new economic situation, and it is just these sectors that the regional transitional economy leans upon. Also the labor markets are oligopsonic, where the demand for labor is predominantly formed by the machine-building industries that have undergone a considerable decline in jobs. It is well known that an industry becomes oligopsonic when the economies of scale bring along a reduction in costs. At the same time their important role in forming demand on the regional labor market enables the oligopsonic industries to exercise much control over the labor market itself. If a decision is made to reduce demand, it will lead to a rise in regional unemployment. The price of labor (wages) can be adjusted as well.

When the efficiency of a special kind of oligopsonistic labor market is assessed, one should take into account both the advantages and the shortcomings of that structure. In industries where large-scale production is efficient, there exist potential risks of imperfect competition. The advantages of large-scale production (economies of scale) and the bottlenecks of imperfect competition (bargaining power) are two sides of one coin.

Comparative analysis of the employment structure allows one to see some certain imbalances on the Russian labor market. First, there is the disproportionately big share of employment in agriculture (if compared with that in economically developed countries) arising from the low labor productivity traditionally observed in that sector. Creation of highly specialized zones in agrarian regions could help overcome this imbalance by making labor productivity rise. Research shows that the process of creating such highly specialized agricultural zones should be implemented in parallel with further diversification of the employment structure of the region. For rural regions that means the development of agricultural services, food processing industries and expansion of non-agricultural employment.

Second, the quasi-market equilibrium point currently existing on the labor market shows the monopsonic and oligopsonic reactions of the regional labor markets to the overall production decline, which is a moder-

ate fall in employment accompanied by a rise in unemployment rather than mass unemployment. The monopsonists' (oligopsonists') strategies applied in the time of transition are quite specific. Whereas in a market economy, the monopsonist simply reduces the number of employed, in the transitional one, he has to maintain employment in his region at a certain level, observing the priorities of the regional authorities controlling social tension in the region. Mass release of labor only occurs under extraordinary circumstances. Employment is kept up due to the low level of wages.

APPENDICES

A. Data Description

International unemployment statistics are based on the following three important sources of information:

- sample surveys;
- official unemployment registration data;
- unemployment insurance statistics.

Official sources of information about the situation on the labor market, rate and duration of unemployment in Russia are regional and federal employment services and sample surveys. The results of sample surveys often times exceed the labor market registration indicators thus posing a problem of comparability of data. Still the curves of dynamics and the differentiation of regional unemployment rates are quite comparable.

This research utilizes the data about general unemployment obtained from labor force surveys. Sample surveys on employment are based on the use of ILO methods (Labor and Employment in Russia, 1999). According to international standards, those who are referred to as **unemployed**, simultaneously match the following three criteria: they are out of work (do not have an income-yielding occupation), they are in search of a job (have applied to government and commercial employment services, administrations of enterprises, or have tried to start their own business), and they are ready to take on a job. The **employed** in the economy are considered to be those having a job or paying occupation, who are hired workers paid in money or in kind or perform other gainful activities without being hired, who are temporarily absent from their main jobs, and who engage in family business without being paid. **Economically active population** (labor force) presumes the totality of employed and unemployed.

The database of regions, made use of in the multi-dimensional sampling typology of regions and cluster analysis, contains indicators for 76 regions of Russia, including 20 republics, 49 *oblasts*, 6 *krais*, 1 autonomous *oblast* and 1 autonomous *okrug* (the rest are not included because of insufficient data). (Regions of Russia, 1999). High variable values have greater weight than do variables with low values. In order to avoid distortions that might arise in our classification, we have calibrated the variables and adapted them to a common scale. All data on the employment branch structure was presented in relative values (shares) at the initial

stage and in the form of standard deviations from the Russian average at the second stage.

Table A.1. Territorial Characteristics of the Sample.

	Territories	General totality	Sample totality
1	Republics	21	20
2	Krai	6	6
3	Oblasts	49	49
4	Autonomous oblasts	1	1
5	Autonomous okrugs	10	*

* since the procedure of cluster analysis employing SPSS excludes from the calculations all observations with missing values for any of the variables, the regions for which even a single indicator was missing were not included in the sample.

B. Variables

Dependent variables.

Un_{it} — unemployment rate in region i at time t;

E_{it} — employment rate in region i at time t;

D_Un_{it} — duration of unemployment in region i at time t;

L_{it} — labor force participation rate in region i at time t;

Independent variables.

$Sh\_Agr_{i,\ t-n}$ — share of employment in agriculture in region i at time $t - n$;

$Sh\_Ind_{i,\ t-n}$ — share of employment in industry in region i at time $t - n$;

$S_{i,\ t-n}$ — size of region i at time $t - n$;

$P_{i,\ t-n}$ — population density in region i at time $t - n$;;

$Sh\_Pr_{i,\ t-n}$ — share of the private sector in the employment structure of region i at time $t - n$;

$Sh\_St_{i,\ t-n}$ — share of the state sector in the employment structure of region i *at time* $t - n$;

$Sh\_For_{i,\ t-n}$ — share of mixed enterprises with foreign participation in the employment structure of region i at time $t - n$;

$Sh\_Ros_{i,\ t-n}$ — share of mixed enterprises without foreign participation in the employment structure of region i at time $t - n$;

$Ent\_Agr_{i,\ t-n}$ —share of employment in small agricultural enterprises in region i at time $t - n$;

$Ent\_Ind_{i,\ t-n}$ — share of employment in small industrial enterprises in region i at time $t - n$;

$Ent\_Tr_{i,\ t-n}$ — share of employment in small trade enterprises in region *i* at time $t - n$;

$Sh\_Tr_{i,\ t-n}$ — share of employment in trade in region i at time t–n;

$Sh\_Fin_{i,\ t-n}$ — share of employment in the crediting, financial and insurance sector in region *i* at time $t - n$;

Bh — share of population with higher education in region *i* at time $t - n$;

Bav — share of population with secondary education in region *i* at time $t - n$;

CR — Concentration ratio;

HHI — Herfindal-Hirshman index.

Concentration ratio (CR3, CR5) and Herfindal–Hirshman index (HHI):

$$CR_K = \sum_{i=1}^{K} S_i\ ,\ i = 1, 2, \ldots, k,$$

$$HHI = \sum_{i=1}^{n} S_i^2,\ .\ i = 1, \ldots, n,$$

C. Taxonomy of Russia's regions

Table C.1. Group Statistics (1998).

	Mean	Std. Deviation	Valid No (listwise)	
(1) *Sh_Ind*	19.110	5.789	20	20.000
Sh_Agr	19.825	3.509	20	20.000
(2) *Sh_Ind*	28.208	2.852	26	26.000
Sh_Agr	8.758	3.621	26	26.000
(3) *Sh_Ind*	20.356	2.920	25	25.000
Sh_Agr	9.740	3.686	25	25.000
(4) Total *Sh_Ind*	22.880	5.639	71	71.000
Sh_Agr	12.221	5.988	71	71.000

Table C.2. Tests of Equality of Group Means (1998).

Группа	Wilks' Lambda	*F*	Df_1	Df_2	Sig(*F*)
(4) Total *Sh_Ind*	0.469	38.454	2	68	0.000
Sh_Agr	0.354	62.121	2	68	0.000

REFERENCES

Aghion, P. and O. Blanchard (1994) On the Speed of Transition in Central Europe, *NBER Macroeconomics Annual*, 283–320.

Aivazian, S.A. and V.S. Mkhitarian (1998) *Applied Statistics and Essentials of Econometrics* (Moscow: UNITY) [in Russian].

Alogoskoufis, G.S. and A. Manning (1988) Unemployment Persistence, *Economic Policy* **7**, 428–469.

Barbone, L., D. Marchetti, and S. Paternostro (1996) Structural Adjustment, Ownership Transformation, and Size in Polish Industry, *Working Paper* No 1624 (Washington: The World Bank).

Bean, C.R. (1994) European Unemployment: A Survey, *Journal of Economic Literature* **XXXII**, 573–619.

Bobeva, D. and Y. Hristoskov (1995) *Unemployment in Agricultural Areas*: *An Overview of Central and Eastern-Europe and a Case Study of a Bulgarian Region* (Paris: OECD).

Burda, M. (1988) Unemployment, *Economic Policy* **10**, 393–425.

Commander S., Q. Fan, and M.E. Schaffer (Eds) (1996) *Enterprise Restructuring and Economic Policy in Russia* (Washington: The World Bank).

Demekas, D.G. (1990) Labor Market Segmentation in a Two-Sector Model of an Open Economy, *IMF Working Paper* **37** (4), 849–864.

Earl, J., and S. Estrin (1996) Privatization versus Competition: Changing Enterprise Behavior in Russia, *Report* No 315. (London: Center for Economic Performance).

Earl, J., and K. Sabirianova (1998) Understanding Wage Arrears in Russia, *Site Working Paper* No 139 (Stockholm).

Elhorst, P. (1994) *Unemployment Disparities between Regions in the European Community* (34 European Congress of the Regional Science Association, Groningen).

Ehrenberg, R.G., and R.S. Smith (1996) *Modern Labor Economics*: *Theory and Public Policy* (Addison-Wesley).

Huber, P. and An. Worgotter (1997) *Local Labor Market Dynamics in the Czech and Slovak Republics* (Paris: OECD).

Kapeliushnikov, R. (2001) *Russia's Labor Market* (Moscow: Higher School of Economics) [in Russian].

Layard, R., R. Jackman, and S. Nickell (1991) *Unemployment*: *Macroeconomic Performance and the Labor Market* (Oxford: Oxford University Press).

Labor and Employment (1999) (Moscow: Goskomstat of Russia) [in Russian].

Mur, J. and J. Trivez (1994) *Modeling Dynamic Interregional Labor Markets*: *An Application to the Spanish Case* (34 European Congress of the Regional Science Association, Groningen).

Nickell, St. (1990) Unemployment: A Survey, *The Economic Journal* **100**, 391–439.

Perevalov,Y., I. Gimadi, and V. Dobrodey (2000) Analysis of the Impact of Privatization on Performance of Medium- and Large-size Industrial Enterprises in Russia, *EERC Working Paper series* **2K/01** (Moscow).

Regions of Russia (1999) (Moscow: Goskomstat of Russia) [in Russian].

Russia in Figures: *Concise statistical handbook* (2001) (Moscow: Goskomstat of Russia) [in Russian].

Saez, M. and C. Murillo (1996) Regional Disparities and National Similarities in Spanish Unemployment: A Case of Seasonal Cointegration? *Applied Economics* **28**, 1529–1544.

Scarpetta, St. and P. Huber (1995) *Regional Economics and Unemployment in Central and Eastern Europe*: *An Attempt to Identify Common Patterns* (Paris: OECD).

Svejnar, J (1991) Labor Markets in the Transitional Central and East European Economies, in: O. Ashenfelter and D. Card, eds, *Handbook of Labor Economics* Vol. 3b (Amsterdam: Elsevier Science) 2809–2858.